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ABSTRACT

Described is a conceptual model for comparing, synthesizing, and evaluating present instructional strategies and for research and development of new instructional programs. The model is based on the assumption that instructor's behavior can be categorized according to observable characteristics and that these categories will be subsumed under the components of (1) aims, (2) content, (3) methods, (4) materials, and (5) evaluation. The author reports that the model has been used by classroom teachers to identify the domain and level of difficulty for instructional objectives. It permits the teacher to identify which psychological theory is acceptable to the philosophy of his school and the nature of the instructional task. These decisions then lead logically to a determination of the emphasis to be placed on each aspect of subject matter and which style of teaching method and what instructional materials are to be employed. Educational researchers have used the model to codify research studies and to determine the implicit theories and philosophical viewpoints which are rarely stated in educational research reports. (LC)

A MODEL FOR ANALYZING AND COMPARING INSTRUCTIONAL STRETEGIES AND PROGRAMS

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INTRODUCTION

The importance of curriculum development and implementation is gaining greater recognition as a vital area of our educational enterprise. The present impetus for curriculum reform resulted from the foreign challenge to American prestige with the successful flight of Sputnik. Weaknesses in the educational system were identified as the principal causes for this national dilemma. Educational reform which began in mathematics and science fields has spread to all subject matter areas.

New patterns of curriculum development and implementation are emerging from these sweeping changes. Until recently, state and regional boards of education developed courses of study and curriculum guides containing their educational objectives with a recommended scope and sequence of instruction. Special interest groups also prepared model curricula for adoption by the schools. The similarity among these guides encouraged authors to write textbooks that would have widespread adoption. The textbooks, in turn, became curriculum models for other school systems. Recently,

teams of specialists in subject matter, learning, and instruction have joined together to develop curriculum materials for the various subject fields.

These new programs reflect the philosophies of their developers; differ in scope and sequence for the same subject areas; and require unique strategies of instruction. By adopting these new materials, a schools system is buying much more than textbooks for pupils. The school is investing in an educational package that is quite different from the old one. A model for comparing these new programs is needed.

Since available models of instruction were inadequate to accommodate these recent developments in learning theory and curriculum design, the taxonomic model described in this paper was developed from a survey of the literature to serve as a logical framework for comparing, synthesizing, and evaluating present practices and for research and development of new instructional programs. It has been tested by pre-service teachers for developing lesson plans, by in-service teachers for revising instructional materials, and by graduate students for analyzing and comparing educational research reports. The purpose of this paper is to describe this conceptual model for organizing information regarding the process of instruction.

The model (figure 1) is based on the assumption that instructors' behavior can be categorized according to observable

characteristics and that these categories will be subsumed under components recommended by educational leaders. These components are:

I. AIMS

II. CONTENT

III. METHODS

IV. MATERIALS

V. EVALUATION

Figure 1

A Model for Analyzing and Comparing Instructional Strategies and Programs

I. RATIONALE	Objectives	Cognitive: Factual : Inferential Thinking Psychomotor Skills Affective Domain
	Learning Theory	Conditioning Cognitive Restructuring Identification
II. CONTENT	Subject Matter	Substance Processes
III. METHODS	Style	Directive Heuristic
	Interaction	Teacher ↔ Student Student ↔ Student Student ↔ Materials
IV. MATERIALS	Type	Concrete Vicarious
V. EVALUATION	Assessment	Learner Instruction Materials Program

Analyses of recently developed science curriculum materials reveal that these elements are applicable to published editions. However, there is no common agreement on style, format or sequence that should be followed in specifying these elements for others. The components of the model contain subsets of principles and practices currently followed in instructional programs. Since it is not feasible to include all of them in this paper, only those identified in Figure 1 will be discussed.

I. AIMS. This component should include statements of aims, goals, objectives, rationale, learning theory and introduction. However, only two categories--objectives and learning theory--are included in Figure 1. Bloom's, Taxonomy of Educational Objectives serves as the basic document for identifying the types of objectives. Recent research indicates that different instructional strategies are needed for two general levels of cognition, and this domain has been divided into those objectives that involve mechanistic or associative learning and those involving inferential thinking or higher-level mental functioning. Skills in the psychomotor domain have been utilized recently as evidence of acquisition of learning in both cognitive and affective domains. While this practice tends to obscure the identification of these skills, this domain is still recognized by teachers and researchers. Levels within the affective domain have been specified by Krathwohl in Handbook II for the Taxonomy of Educational Objec-

his admiration. Originally applied by psychoanalysts to the acquisition of the super ego by children through identification with their parents, the concept is also applied to the ways in which students learn from their teachers. This school also maintains that most learning occurs without conscious realization on the part of the learner and more attention is given to development of the Affective Domain as a determinant of learning. Each of these three schools of thought was developed to interpret learning from a different point of view. It has been the custom in the past for educators to accept one view and reject all others. It is our contention that each may be used for interpreting and scheduling instructional procedures.

II. CONTENT. Currently, philosophers advocate a definition of content that includes two aspects--the organized body of knowledge within a discipline and the strategies for discovering or creating that knowledge. Most instructional programs in recent decades have emphasized the attainment of concepts, facts, vocabulary and general principles. Today, greater attention is being directed toward teaching the strategies or processes of investigation. The present goal is to teach both the subject matter and the investigative procedures, because little learning is said to occur without acquisition of both aspects. In practice, teachers focus on only one aspect as they are teaching a lesson. The other is taught later or neglected.

tives. Recent political events will probably renew interest in this domain by educators.

Three general families of learning theories have been listed. The Conditioning approach sees learning as consisting of the formation through experience of new connections between stimuli and responses. Other descriptions of conditioning theory exist to account for more complex S-R bonds that result from more complex situations. In general, it is agreed that it is the modification of the S-R bond that should be called learning.

The Cognitive Restructuring approach sees the learning process as informing the learner of the correct anticipated response and a procedure for achieving it. Cognitive structure refers to an arbitrary organization of facts, concepts and principles. It is determined partly by how man's mind works and partly by the nature of the subject, ie., the intellectual discipline to be learned. Properly organized subject matter presented to learners whose cognitive development is correctly understood will produce learning of the best kind, according to the value system of many educators. This learning occurs as the individual consciously re-arranges his existing knowledge to develop a conceptual framework that can be altered to accommodate new experiences. It is this process of restructuring symbols that constitutes learning.

Identification theory holds that learning occurs as an individual models his activities on those of another because of

There is no general agreement on which specific facts should be taught at which grade level. Attempts to codify concepts on the basis of children's interest have not been successful. Both Inquiry and Creativity approaches have identified some factual information that enhance their efforts. Scope and sequence charts have also been used by teachers for identifying subject matter to be included in the curriculum. The processes of science are identified and explained in the Commentary for Teachers for A.A.A.S., Science -- A Process Approach.

III. METHODS. Two categories of methods are presented in the model to permit analyses of instructional activities from two points of view. One group of instructional theorists classifies "method" as a sequence or pattern of activities which may be sub-divided into preplanned, highly structured classroom presentations by a teacher or a technological device. Another type of sequence involved an inductive, flexible approach that is adjusted as the learner progresses toward a goal.

A second view of instruction considers only the short-range immediate goal attainment as an appropriate definition of teaching method. The interaction among people or between the learner and a machine becomes the loci. To measure these, classroom interaction analysis forms have been developed. The three category system presented here can be used for codifying both verbal and non-verbal interaction for any of the Objectives, Learning

Theories, or Subject Matter. It identifies for the instructor some variables that can be manipulated during the teaching act to permit a systematic analysis of the consequences of this behavior.

IV. MATERIALS. Materials are classified as concrete or vicarious according to their use at a given moment, ie., books are normally considered as vicarious because they relate the experiences of others. However, if a book is used as a weight on a balance, it becomes a "direct" or "real" experience for the user. Concrete materials encourage the use of multi-sensory learning while vicarious materials rely more on symbol manipulation.

V. EVALUATION. Evaluation includes both the assessment of outcomes and a comparison with desired goals. Instruction may be assessed by measuring the extent and quality of change in the learner, results for different instructors, or the teachability of the instructional program. Since the confidence level of the assessment is influenced by the validity and reliability of the measuring instrument, clear specification of objectives and the manipulated variable enhance the specificity and quality of the findings.

In summary, this model has been used by classroom teachers to identify the domain and level of difficulty for instructional objectives. It permits the teacher to identify which psychological theory is acceptable to the philosophy of his school and

the nature of the instructional task. These decisions lead logically to a determination of the emphasis to be placed on each aspect of subject matter and which style of teaching method and what instructional materials are to be employed. Choices of assessment instruments and strategies are more rational if they follow a logical pattern derived from this model.

Investigators have used the model to codify research studies and to determine the implicit theories and philosophical viewpoints which are rarely stated in reports. These activities should evolve into the development of some rational structures for instructional theorists and elevate the process of instruction and curriculum development to a systematic study rather than a set of proposals with justifications for them.

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